

What is claimed is:

1. A method of performing density gradient separations comprising the steps of:
at least partly forming and immobilizing at least one part of a density gradient solution,
wherein the density gradient solution may be subjected to conditions that under some circumstances
would degrade the density gradient solution if it were not immobilized; and
re-mobilizing the density gradient solution just before using for a separation process; and
utilizing the density gradient solution in a separation of process.
2. A method in accordance with claim 1 in which the step of at least partly forming the
density gradient solution includes the step of forming layers of different density and immobilizing
the layers of different densities.
3. A method in accordance with claim 2 in which the step of forming different densities
includes the step of mixing fluids of different densities in a series of different proportions to form
a series of different density layers.
4. A method in accordance with claim 3 in which the different density fluids are brought
close to the freezing point and layered into a container sufficiently cold so as to immobilize the
layers as they are inserted into the container.

5. A method in accordance with claim 1 in which the step of at least partly forming at least one part of a density gradient solution includes the step of forming a density gradient solution with a density gradient former and freezing the density gradient solution before defusion degrades it.

6. A method in accordance with claim 1 wherein the step of at least partly forming and immobilizing at least one part of a density gradient solution includes the step of freezing at least portions of different density material; said method further including the steps of :

packaging the different density portions; and

shipping packages of different density portions to other locations for assembly into density gradient solution tubes.

7. A method of forming a density gradient solution comprising the steps of:

gathering immobilized fluid units of different densities having a size appropriate for inserting in a density gradient tube;

inserting a highest density immobilized unit into the tube and following it with successively lower density units, wherein an immobilized density gradient solution tube is formed.

8. A method in accordance with claim 7 further including the steps of:

re-mobilizing the units in the density gradient tube; and

permitting the re-mobilized units to defuse together after re-mobilization to form said density gradient solution.

9. A method in accordance with claim 8 in which the step of re-mobilizing a unit comprises the step of freezing a unit.

10. A method of forming a density gradient solution comprising the steps of:
drawing fluid from a high density fluid source;
drawing a second fluid from a lower density fluid source;
mixing the fluids and layering them into a liquid density gradient tube;
repeating the process while changing from a large amount of the highest density fluid to lower and lower proportions whereby layers of different proportions of fluid are applied to the liquid density gradient tube; and
immobilizing the fluids in the density gradient tube before the layers diffuse together.

11. A method in accordance with claim 10 in which the step of immobilizing the fluids comprises the step of freezing the fluids.

12. A method in accordance with claim 10 in which each of the layers are precooled and applied under circumstances that cause immobilization.

13. Apparatus for forming a gradient comprising a central station;
said central station including a gradient former and a refrigeration unit;
a plurality of remote stations;
each of said remote stations including means for re-mobilizing said density gradient solution.

14. A gradient former comprising:

- a first pump;
- a second pump;
- a first source of fluid having a predetermined density;
- a second source of fluid having a second predetermined density;
- a mixer;
- said first pump communicating with said first source of fluid to pump fluid into said mixer;
- said second pump communicating with said second source of fluid to pump a second fluid into said mixer;
- a control unit for controller;
- said pumps to mix fluids at a series of predetermined densities for application to a density gradient tube; and
- means for immobilizing the fluids in said density gradient tube.

15. A gradient former in accordance with claim 14 further including a means for mixing said different layers in said density gradient tubes so as to form a continuous gradient in said tube.

16. A gradient former in accordance with claim 14 in which the means for immobilizing includes a means for freezing.

17. A density gradient solution comprising;

a continuous solution with different portions having different densities;

said solution being immobilized.

18. The density gradient solution of claim 17 in which said density gradient solution has a plurality of discrete different density sections.

19. A density gradient in accordance with claim 17 in which said density gradient solution is frozen at least in part.

20. A density gradient solution in accordance with claim 17 in which the density gradient solution is complete and has a continuous variation.